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A REVOLVING PLANT CAGE FOR USE IN INSECT SELECTIVITY STUDIES

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The revolving cage (fig. 1) herein described has been found useful in conducting experiments with repellent spray materials against the beet leafhopper (Eutettix tenellus (Baker)) and in determining the comparative aversion of this insect to the various varieties of sugar beets and beans. The construction and operation is such that light and temperature factors are equalized and the insects are allowed to select any of the plants contained in the cage. A sliding partition separates the plants into compartments so that the insects on each plant may be recorded.

Construction

The cage (fig. 2) is constructed on the wheel and one-half of the axle of a discarded automobile. The axle was set in the concrete at a desired height above the greenhouse floor. The base of the cage was constructed of 5-ply board 32 inches square. Four holes, 4 inches in diameter (fig. 3), were cut on diagonal lines, 12 inches from the corner of the base, to hold potted plants. The details of the cage construction are shown in figures 2, 3, and 4. The rigidity of the cage will be improved if all joints are glued and fastened with screws before the glue is dry. Steel corner braces connecting the partition uprights with the cage frame are also helpful. All wooden parts of the cage should be coated with linseed oil.

The corners of the cage were rounded to improve visibility and to facilitate removal of the insects. The outer corner and a portion of one side of each compartment were made of celluloid so

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that the insects could be easily observed. After the celluloid had been tacked on the inside of the cage frame it was cemented to the cage with acetone to insure an insect-proof enclosure. The top and a portion of one side of each compartment were made of 30-mesh wire screen to provide for circulation of air, and a grommet to hold a cork was placed in the center of each screen so that the leafhoppers could be easily removed.

The sliding partition was made from two pieces of 26-gauge galvanized iron bent at right angles and welded in the form of a cross to a 1/2-inch open pipe, as shown in figure 3. This pipe was capped at the top and opened at the bottom and was used to introduce the insects into the center of the cage. The 1- by 2-inch uprights in the frame were grooved and waxed so that the partition would slide smoothly. The cage was made insect proof by the use of cylindrical weather strips at all points where the sliding partition and the frame came into contact. The points of contact between the sides of the cage and the partition with the base were made tight with sponge-rubber weather strips.

Sash locks were used to hold the cage and base together during operation. For removing the cage from the base to replace the plants, a cord was run from the screw eyes placed at each corner to a pulley anchored above. The cord was unhooked from the screw eyes before the cage was set in operation.

The cage was rotated by means of a 1/4-horsepower electric motor, an old cream separator being used for the reduction gear (fig. 5). The separator-bowl housing was cut away to permit the operation of a 5-inch pulley from the bowl spindle to a 2-inch pulley on the motor by means of a V-belt. A $2\frac{1}{2}$-inch pulley placed on the axle of the separator handle was connected to the automobile wheel by 1/4-inch round belting. A belt guide aided in keeping the belt in the proper position on the automobile wheel. Using the pulley set-up as described, the cage rotated once in every 97 seconds. By using pulleys of different sizes it was easy to change the speed of rotation. The separator and motor were mounted on a wooden frame, which was fastened to a concrete block. To avoid unnecessary vibration, sponge-rubber pads may be used under the motor reduction-gear units. If desirable, an additio nal revolving cage may be operated from the same motor and reduction-gear unit by attaching another pulley on the opposite side of the axle of the separator handle, as shown in figure 5.

Operation

The cage was raised by the pulley and cord from the base while the potted plants were arranged in the holes cut in the base for this purpose. The cage was then lowered and fastened to the base by the sash locks, and the partition was raised, as is shown in

figure 6. While the cage was revolving the desired number of leafhoppers were introduced through the 1/2-inch pipe into the center of the cage. After the cage had been run for the desired length of time, and while it was still rotating, the partition was lowered quickly to prevent the insects from moving from one plant or compartment to another (fig. 7). The motor was then stopped, and the insects from each compartment were removed by means of a long T-tube sucker, and recorded.

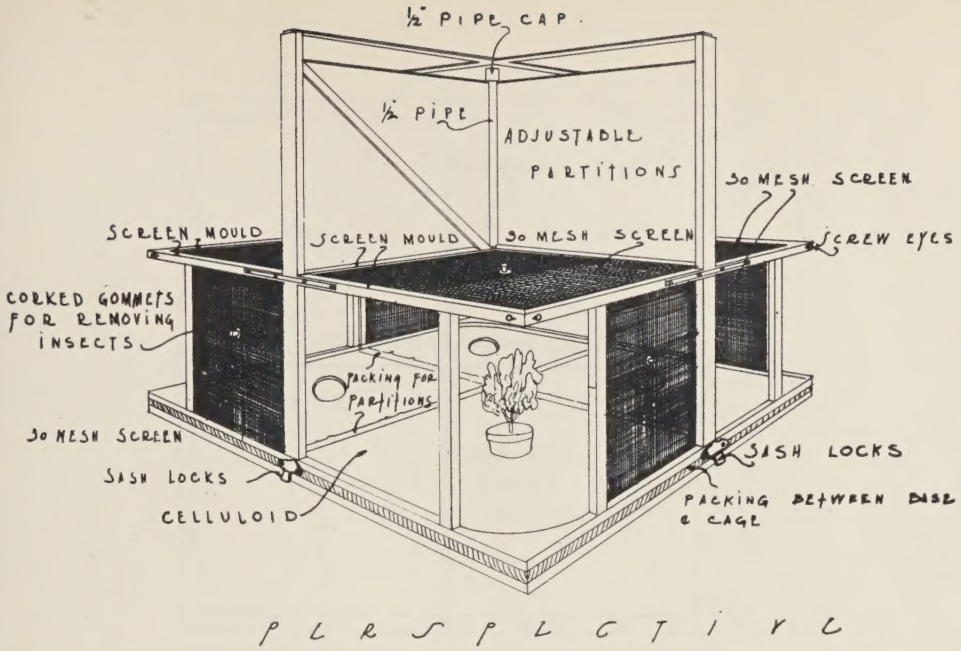

Figure 1.—Perspective view of the cage.

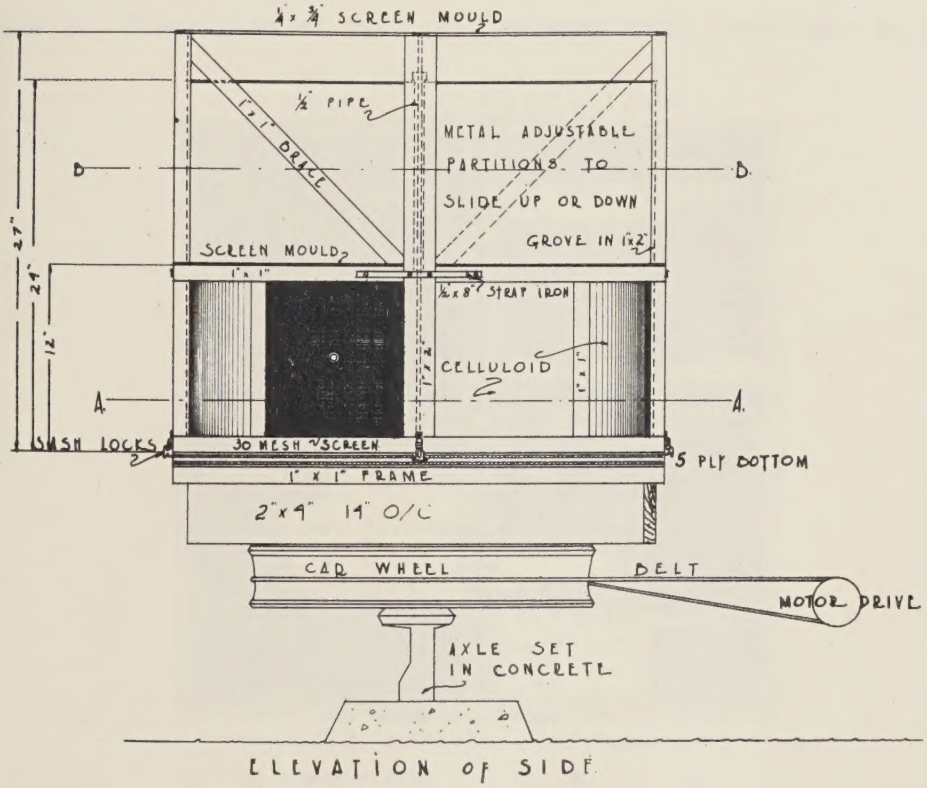

Figure 2.—Side view of the cage showing mounting.

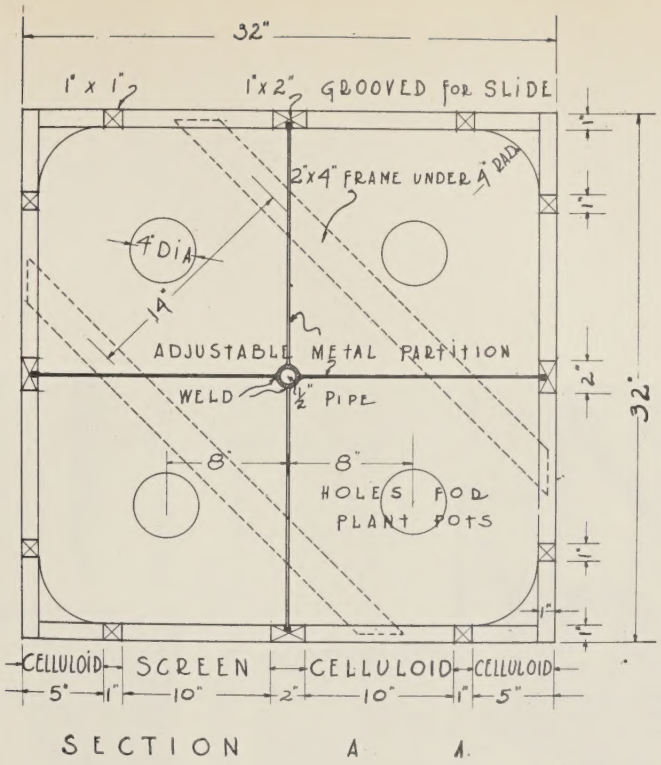

Figure 3.--Floor plan of the cage, showing metal partition in place.

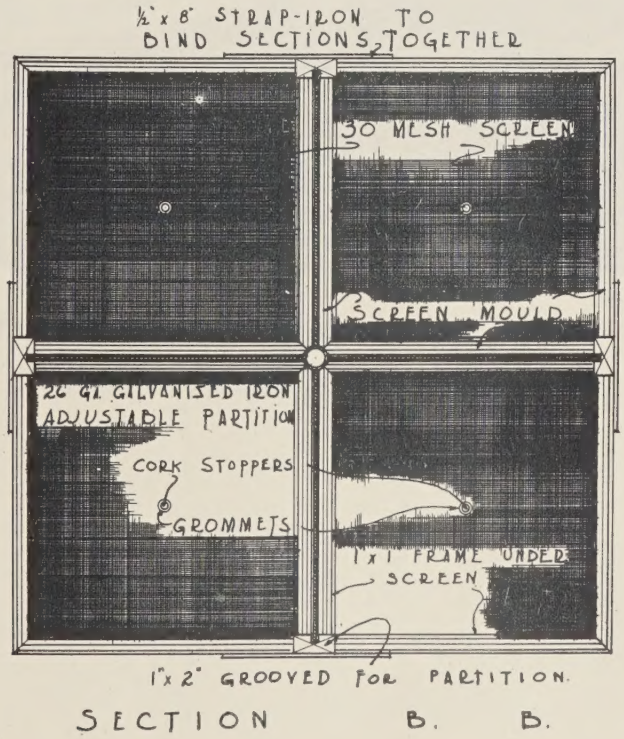

Figure 4.--Section showing construction of the cage top.

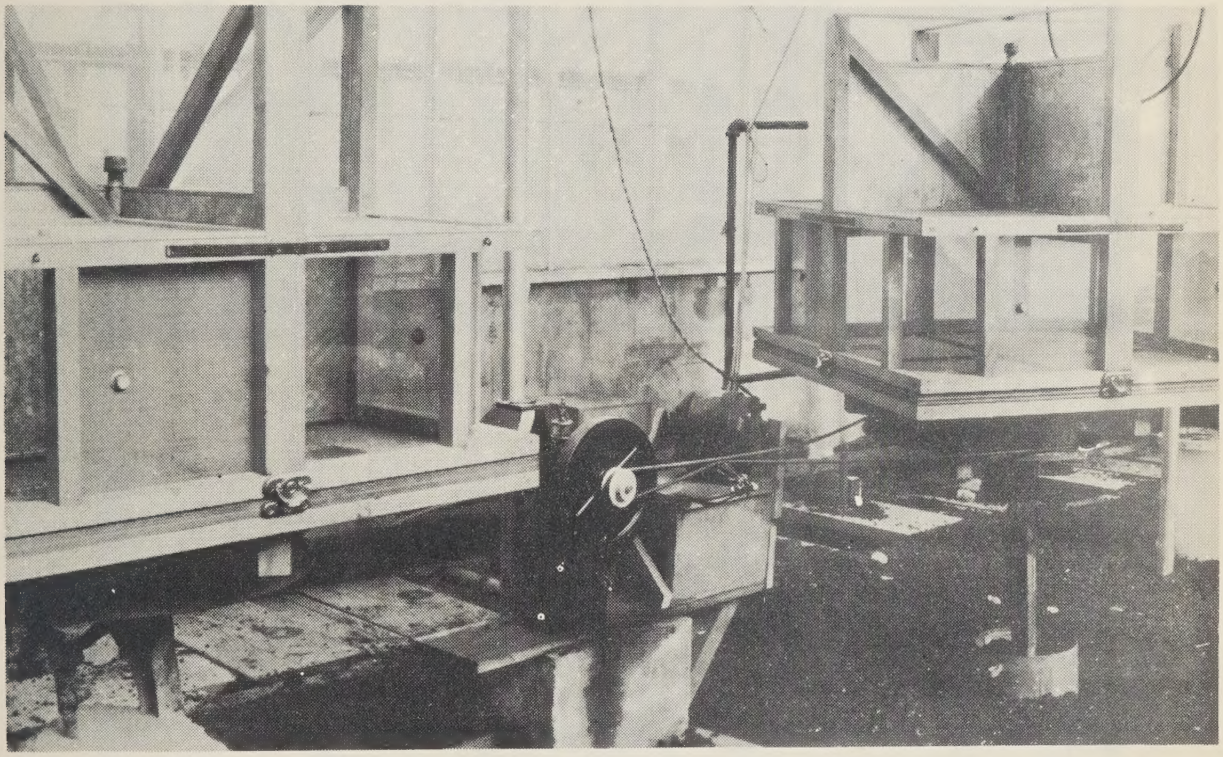

Figure 5.--Mounting of cage and motor.

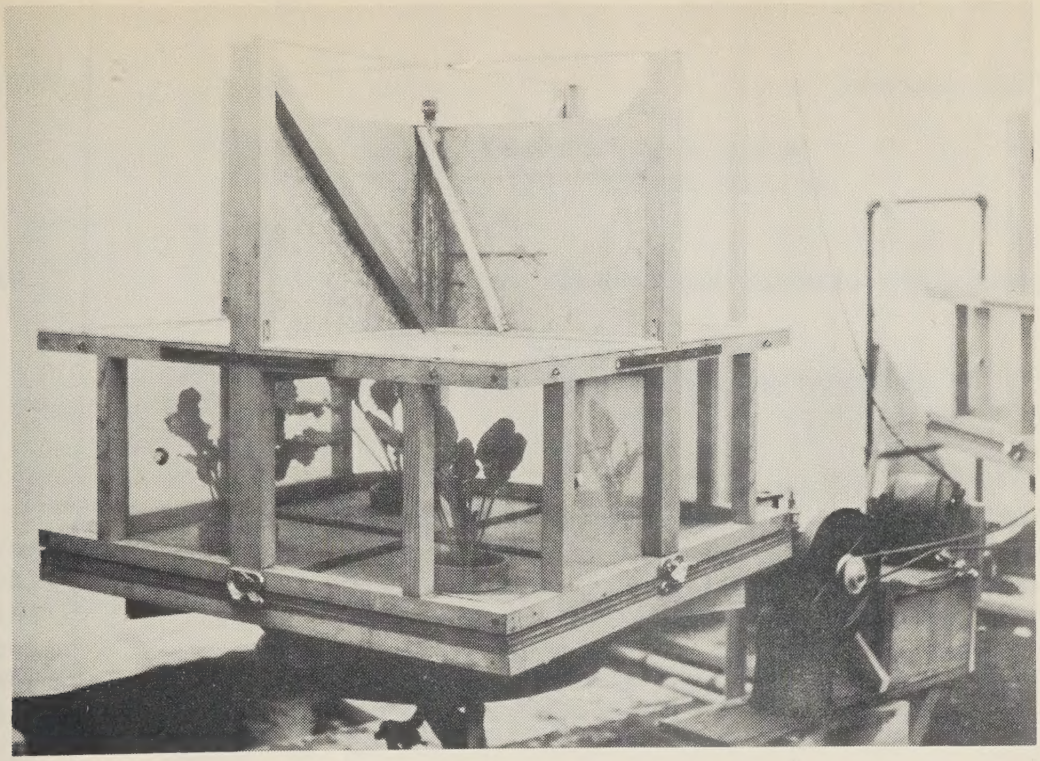

Figure 6.--Cage with partition up.

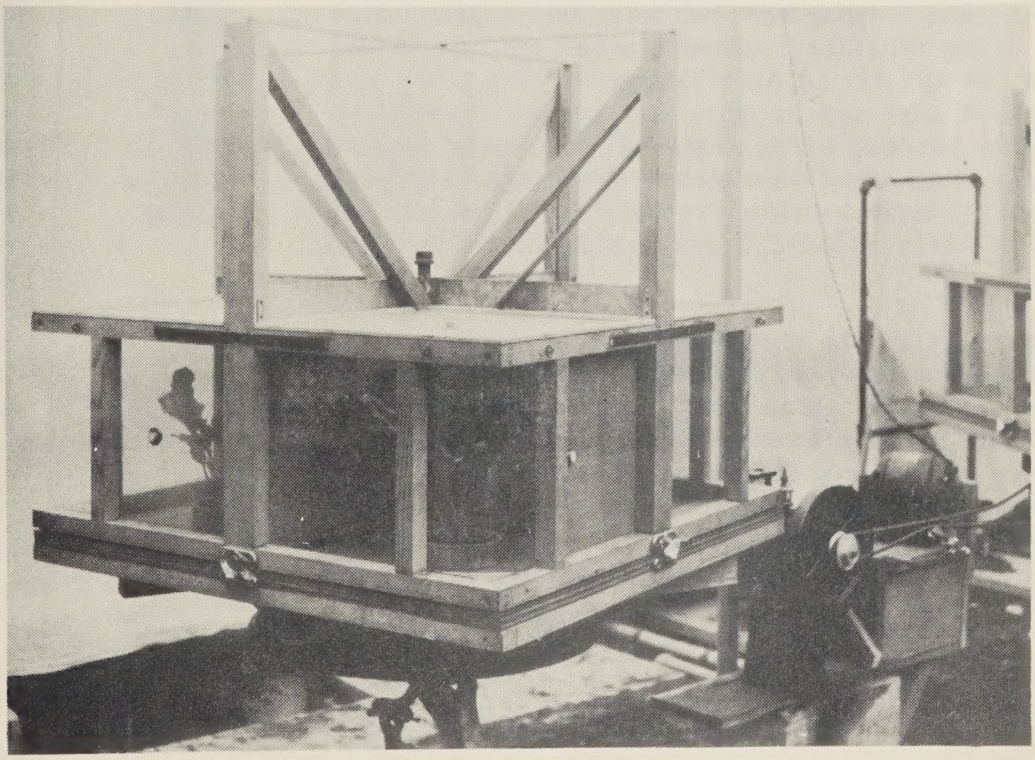

Figure 7.--Cage with partition down.